place in Britain about once every forty years, so maybe twice in a lifetime at this one location.

It seems unlikely that such falls are becoming more frequent, but because of the increased 'pace' of modern life where people are, generally speaking, more mobile (in both frequency and speed of travel) than ever before, they are consequently more likely to travel beneath or into a relatively slow-moving large cumulonimbus cloud and hence encounter more in the way of severe storms. It has been speculated that the violent convection, needed to cause these 'monsters' to form and become so active where they do, could have been 'triggered' by differential heating plus uplift of air flowing over Downland ridges. (For those intrigued by the apparent contradiction in terms the word 'down' is derived from the Old English word 'dun' meaning a 'hill').

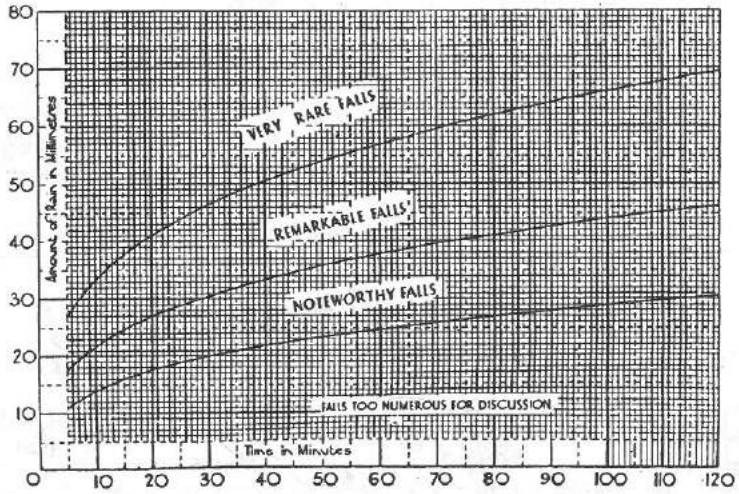

Fig. 2

The classification of heavy rainfalls in short periods in Britain was revised and updated by Ernest Bilham of the Meteorological Office. His simple graphic definition of totals against time (Fig.2) is still officially valid, having first appeared in the 1935 edition of *British Rainfall.* A 'very rare' fall (e.g. the 6th August 1952 storm at Boreham Wood; see *Met. Mag., 81,* 302-305) is expected to happen once in about 160 years, so with a 'return period' once every century or two at any one place, someone there only has a '50-50' chance of seeing this in their lifetime. This chance increases somewhat with frequency of travel, and can be considerably enhanced if that observer goes out of the way to chase storms!

Although the 'remarkable' fall occurs about once every forty years, civil engineers tell us that storm drains cannot be economically designed to cope with this infrequency of event. Residents having to bale out their flooded homes and insurance company 'loss adjusters' would argue that bigger if not more numerous drains would be an answer, especially since a 'noteworthy' fall, itself quite capable of overburdening the drains, is seen about once every decade at a certain geographical location.

The storm of 10th August 1986 was observed by the Meteorological Office National Weather Radar Network (the nearest scanners to Newbury are at Upavon, Wiltshire, and at Cheines on the Chilterns). Rainfall intensities up to 40-45mm per hour were interpreted by computer with the heaviest totals estimated over a small area between Greenham and Ecchinswell (Fig.1). Unfortunately, apart from 'Thames Water Board' stations, there is a dearth of rainfall records from the Newbury area . . . only USAF Greenham Common providing a reliable measurement closeby the storm centre, so the 50mm isohyet has been estimated, with the help of radar data-reports, courtesy of Tony Waters at Met. 0.15, Bracknell.

If any reader is interested in becoming a volunteer to make regular rain gauge readings, a free booklet entitled 'Rules for Rainfall Observers' is available on request from the Meteorological Office, Met. 0.1c(3), Eastern Road, Bracknell, RG12 2UR. New observers are particularly needed in rural areas where the official network is sparse, a condition which has been aggravated in South-East England by current estate agency practice of encouraging property sales and hence mobility of potential observees. Once certified as correctly-exposed, your gauge records will be archived at Bracknell alongside those commenced in 1677 by a Mr. Townley, England's first known rainfall observer.

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WHIRLWINDS, SEA-SERPENTS AND THE LOCH NESS MONSTER

By MICHAEL W. ROWE

In 1976 Dr. Meaden published a paper in this journal in which he proposed that some reports of 'monsters' in Loch Ness and other lakes and rivers could be explained as sightings of whirlwinds, particularly water devils (Meaden, 1976a). In a later issue Sir Peter Scott, who has studied the problem of the Loch Ness monster for many years, agreed that Dr. Meaden's theory could well be the explanation for a number of sightings (Scott, 1976). He posed several questions, which were answered by Dr. Meaden (Meaden, 1976b).

Until recently there seemed to be no records of whirlwinds on Loch Ness, but in the past few months I have received two reports. Both are unfortunately very lacking in detail, but they are worth putting on record in view of Dr. Meaden's theory.

The first report was sent by Mr. Peter Moore, who had seen a whirlwind in Urquhart Bay (NH 5329) on the western side of the loch. The whirlwind was seen for only about two seconds, but Mr. Moore recognised what it was, as he had seen whirlwinds on Loch Lomond on at least five occasions.

The other whirlwind was seen by Clare Page, a pupil of mine at Priestlands Comprehensive School, Lymington. Again there are few details, as Miss Page was

only about eight years old when the incident took place (probably in 1983). From a rough sketch map it appears that the whirlwind was not far from Urquhart Castle, and hence in the same general area where Mr. Moore's sighting took place. Miss Page described her whirlwind as cone-shaped. These two cases may have been water devils, or they may have been eddy whirlwinds, of which TORRO now has a considerable number of reports from lakes and sea lochs in mountainous areas (chiefly western Scotland and the Lake District).

The whirlwind theory can only explain a small proportion of sighting of the Loch Ness monsters. The sightings that sounds most like an observation of whirlwind is probably that by Mr. Ian Milne (Meaden, 1976a). In the version given by Witchell (1975) Mr. Milne says "I saw spray being thrown up into the air to a considerable height", which is very suggestive of a whirlwind, although unforunately we are not told how high the spray was thrown. There is disagreement about both the date and the time of this incident. Witchell gives 7.00 p.m. on 22nd July 1930, and other authors also state that it occurred during the evening. Mackal (1976) gives 0730 or 0815 on 14th July 1930.

Two of the sightings discussed by Dr. Meaden should probably now be discarded. The 1933 case is an important one to monster enthusiasts, who regard it as "the start of the long saga of the Monster" (Witchell), but Binns (1983) says that the incident was "wildly exaggerated" by a partisan press reporter. Binns has also shown that the famous confrontation between St. Columba and the monster is fictitious.

If a few reports of lake monsters are due to sightings of whirlwinds, the same could be true of sea-serpents. Dr. Meaden (1976b) mentions one instance, the 'Bay of Meil Monster' seen in the Orkneys in August 1910. Heuvelmans (1968) quotes the following description of "an object rising out of the water about 50 yards to seaward . . . It was about a yard high when he first saw it, but, as he watched, it rose slowly from the surface to a height of 20 or more feet – a tapering column that moved to and fro in the air . . . While this 'tail' was still moving in the air they could see the water rippling against a dark mass below it which was just breaking the surface, and which they presumed to be the animal's body. The high column descended slowly into the sea as it had risen." This object, which was seen on Loch Scavaig (NG 4916), Skye, in "the early years of the present century", sounds more like a whirlwind than an animal. The same witness, Sandy Campbell, also reported that on another occasion two men fishing off Rhum (NM 3798) in the Hebrides saw "an object about 30 feet in height moving to and fro out of the sea. The day was fine and hot, and they thought they could see the body in the water". Here again there is no real evidence that an animal was being observed, and a devil waterspout seems a distinct possibility.

Later, in the summer of 1917, there was a similar sighting in Loch Brittle (NG 3918), Skye. "It appeared as a high column, said to be a great deal higher than the object Sandy had seen in Loch Scavaig, and light flashed at the top of the column as though a small head were being turned from side to side. There was a considerable commotion of water astern of it, but no other portion of the body was visible above the surface. It submerged slowly until nothing was left showing above the sea, and it seemed to descend vertically and without flexion".

Heuvelmans comments, "This time we seem to have the long-necked sea-serpent again". If its neck was "a great deal" longer than the 20-foot neck on the object seen in Loch Scavaig, "long-necked" would seem to be a distinct understatement. A waterspout is a much more likely explanation. The light at the top of the column, if not simply due to faulty observations (the object was a mile away) may have been some type of electrical discharge such as has been observed inside tornadoes and tornadic waterspouts on several occasions; it is certainly not explained more easily by assuming that the column was animate.

Another somewhat similar case – oddly enough, also off Skye – took place in September 1893 and was witnessed by Dr. Farquhar Matheson and his wife, who were on a boat trip near Kyle of Lochalsh (NG 7627). "It was a beautiful day, clear as possible, the sun shining brightly, and without clouds. The time was between one and two . . . Suddenly I saw something rise out of the Loch in front of us – a long, straight, neck-like thing as tall as my mast . . . It was then 200 yards away, and was moving towards us. Then it began to draw its neck down, and I saw clearly that it was a large sea-monster – of the saurian type, I should think. It was brown in colour, shining, and with a sort of ruffle at the junction of the head and neck. I can think of nothing to which to compare it so well as the head and neck of the giraffe, only the neck was much longer, and the head was not set upon at right angles to it as a continuation of it in the same line. It moved its head from side to side, and I saw the reflection of the light from its wet skin . . . I saw no body – only a ripple of water where the line of the body should be". The object appeared every two or three minutes, for about two minutes at a time. Heuvelmans says that Dr. Matheson's son suggested many years later that it must have been a whirlwind.

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SOME CLIMATIC HAZARDS OF THE BONNY ESTUARY, NIGERIA

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Abstract: This study analyses the diurnal and seasonal variation of some climatic hazards that affect environmental activities in the Bonny Estuary of Nigeria. Among the hazards considered are haze, fog, mist, thunderstorms, lightning, squall or disturbance lines, and flood and erosion. The study finds that haze, fog and mist are predominantly dry-season hazards while thunderstorms, lightning, and squalls are principally rainy season hazards.

On a diurnal basis, haze occurs between 0600 GMT to 2200 GMT while the highest frequency of occurrence for fog is between 0500 GMT to 1000 GMT and for mist between 0100 GMT and 1000 GMT and 1600 GMT and 2400 GMT. Two peak periods are discernible for the occurrence of thunderstorms: 0500 GMT in the morning and between 1200 GMT and 2200 GMT.